

DESCRIPTION OF THE INVENTION

The present invention relates to a system of chair with suspended seat (seat) ergonomic and releasing, adjustable, with complete and made safe variable slope, balanced by the only weight of the body without mechanism nor notch.

Certain systems of chair allows a variable slope but authorize only one physical relieving partial of the body, not supporting it in its entirety of the head to the feet or presenting a non ergonomic rigid seat.

Of another systems of chair present a flexible seat but do not have any adjustment length of this seat nor of the position of the head-rest, not being able to adapt precisely to various morphologies of the users.

Some other systems of chair allow a variable slope but authorize only one partial or limited slope, allowing either only the slope of the only file of the seat, maybe that a maximum slope in a position half lengthened, maybe that a slope simultaneously involving a variation and a deformation of the form of the base of the chair and thus limited by the friction of the base on the ground.

Lastly, other systems of chair with variable slope are conditioned by the obligation for the user to leave or to move its sitting position, or to set up additive devices or mechanisms, electric or different, or to develop a particular effort to incline or rectify the seat.

The system according to the present invention as follows supplements and improves the systems of existing chairs with variable slope:

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The system according to the present invention as follows supplements and improves the systems of existing chairs with variable slope:

1) System of suspended seat, ergonomic and releasing:

By the 2 following processes, the system according to the present invention indeed allows an ergonomic support of the whole of the body of the user, involving a relaxation and a muscular and circulatory relieving real whatever the adopted slope:

1-a) the 1st process consists of a flexible seat, adapting ergonomically to the shape of the body of the user, sat suspended on the 2 ends of the carriage of seat and supported on the level of the knees, associated a removable and adjustable head-rest and an integrated footrest.

The whole of the body of the user is thus supported in permanence of the head to the feet in all the positions permitted by the seat. This suspended flexible seat distributes and supports completely the weight of the body and allows a muscular relaxation whatever the selected slope.

1-b) the whole of the body being thus supported permanently, it profits from a proceeded 2nd of rest-foot interdependent of sat in its variations of slope.

The seat suspended on the involving and supporting carriage of seat jointly and completely the body of the user in all the positions (see proceeded 1-a of support of the body), the body can be inclined in maximum reclining position (see proceeded 3 of tilting slope), feet then being simultaneously concerned and being supported by the footrest integrated in the carriage of seat, allowing the circulatory relaxation of the body of the user.

2) System of adjustment of conformation of seat

By the 2 following processes, the system according to the present invention allows an adjustment of the conformation of seat to adjust it with the morphology of its user.

2-a) the first process the shortening or the lengthening of this seat according to the size of the user allows. This process is based on a system of adjustment forwards or towards the back of the bar of fastener of sat in its lower part by points of fastener on the carriage of seat, the bar of fastener of sat in its higher part fixed remainder. These symmetrical points of fastener make it possible to regulate the length of seat and its tension by the advance or the retreat of this bar of fixing. One can thus shorten or lengthen the seat according to the size of the user.

2-b) the second process allows the repositioning of the head-rest on seat according to the size of the user. This process is allowed by the removable and adjustable system of the position in height of this head-rest, by self-adhesive side legs fixing and tightening the cushion on the file part of the carriage of seat. One can thus position exactly the head-rest according to the size of the user.

3) System of chair with complete and protected variable slope

The system according to the present invention consists of a seat (see proceeded 1), suspended on carriage of seat rocking and deformable longitudinally and reversibly on a fixed base, rigid and non deformable, independently of this base and without modification of this one, while having a system of stops of safety fixed on the base, controlling into obstinate the back rocker.

By the 3 following processes, the system according to the present invention allows a variable slope, complete and protected of seat, allowing the user to modify the slope of the seat of the sitting position with the reclining position, with all the possible intermediate positions, without risk of inversion in maximum back position.

3-a) the 1st process is based on the constitution of the basis of the carriage of seat in a deformable centred semi-parallelepiped made up of 2 semi-quadrilaterals joined between them, equilateral deformable and symmetrical in 2 parallel plans centring the structure of the seat, authorizing the free rotation of the unit seat/carriage of seat suspended on the stable and rigid base:

- This deformable semi-parallelepiped is defined by the meeting of the 3 rigid parts composing the carriage of seat, fixed and swivelling between them and on the base, this meeting forming 2 symmetrical equilateral semi-quadrilaterals in the 2 parallel plans, their equilateral shape being defined by the equal distance enters the 4 points tops of the 2 quadrilaterals one by one.
- These 2 symmetrical equilateral semi-quadrilaterals in 2 parallel plans each one are fixed and swivelling by rotation on the stable base in 2 fixed points at their 2 higher ends around 2 imaginary parallel enter them fixed axes and perpendicular to the 2 preceding plans, and fixed and swivelling by rotation in 2 points consisted their 2 lower angles around 2 other axes parallel with the precedents. These 2 equilateral semi-quadrilaterals are thus deformable longitudinally in equilateral rhombuses flattened by rotation around their 4 angles in the 2 preceding parallel plans.

- the parallelepiped thus made up is deformable longitudinally and symmetrically by pivot on the stable base around its 2 fixed higher axes and its 2 lower axes, these 4 axes being parallel and perpendicular to the 2 parallel plans centring the structure.

3-b) the proceeded 2nd is consisted the interaction by rotation of the preceding parallelepiped on the remainder of the structure of the carriage of seat (back and footrest), whose constitutive part it is.

The carriage of seat, fixed and swivelling freely on the stable and non deformable base, supports and carries the seat, itself supporting the user. Any deformation and lengthening of the carriage of seat involve the deformation and the lengthening of seat and thus the variation of slope of the position of the user.

3-c) the 3rd process allows the control of the maximum back variation of the lengthening and the rocker of the whole of the structure carriage of seat: this control is ensured by the existence in butted of 2 stops of safety fixed on the stable and non deformable base against which comes "to butt" the carriage of seat in its high part.

4) System of chair with slope balanced by the only weight of the body

The system according to the present invention allows a control and a balance of the slope of the structure seat/carriage of seat by the only weight of the body of the user, without extra mechanism or device. This system is allowed by a process of alignment and interaction on the same axis of the weight of the body of the user in the centre of the seat of the chair and the centre of balance of the carriage of seat.

This process of alignment connects:

- the point of balance of the weight of the body of the user in the centre of flexible suspended and fixed seat in its 2 ends and supported and sliding freely on the level of the knees (see proceeded 1), on 3 constitutive bars of the carriage of seat itself fixed and swivelling on a stable and rigid base (see proceeded 3), the whole of the carriage of seat being balanced on:

- the point of centring of the deformable parallelepiped previously definite (see proceeded 3), located at the intersection of the axes joining its opposite tops and constituting the point of balance of the carriage of seat.

The two points superimposed above define an axis connecting the point of balance of the weight of the body of the user to that of the carriage of seat. The parallelepiped, basis of the carriage of seat, making up of 2 equilateral quadrilaterals (see proceeded 3), this axis is parallel with the vertical axes of these 2 quadrilaterals and thus with the plan of slope of the whole of the carriage of seat.

The unit seat/carriage of seat being interactive and swivelling (see proceeded 3), any transfer of the weight of the body of the user on seat implies the reciprocal displacement reversed of the point of centring of the carriage on their axis of alignment and the longitudinal corollary deformation of the parallelepiped and the carriage of seat: the slope of the seat follows the weight of the body.

The description and the setting up of the preceding processes according to the present invention are illustrated in figures 1 and 2 following:

- figure 1 presents the system of this invention in its sitting starting configuration,
- figure 2 presents the system of this invention in its variation of maximum slope

Description of the system:

In reference to these 2 figures, this system comprises 3 large components:

1. a flexible seat (A), equipped with a head-rest (E) removable and fixed by adjustable side fasteners (L1, L2) (laces, pressures or another mode of fastener). This base is fixed and/or suspended on the carriage of seat:

- in its 2 ends out of 2 bars (T2, T5), so as to slide freely in rotation (brackets or another mode of fixing), T5 being fixed and removable T2 to allow the fixing and the adjustment length of seat
- on the level of the knees on a fixed bar (T1), so as to slide freely
- on the level of the ankles on a fixed bar (T3), so as to slide freely

2. a carriage of seat composed of 3 rigid parts, fixed and swivelling between them (B1, B2, B3), jointly constituting the executives of the back and seat, and organizing itself as follows:

- B1: a semi rigid parallelogram at 3 sides out of U, supporting seat on its higher side (T5), fixed and swivelling at its 2 lower ends by 2 symmetrical points of rotation (4), equipped with joints antifriction metal, along an axis (X4), on 2 parallel levels between them perpendicular to this axis, on:
- B2: a rigid parallelogram at 4 sides, building the integrated footrest (R) on its front side, equipped with the 2 transverse bars allowing sliding motion (T3) and fixing and the adjustment in length (T2) of seat, B2 being fixed and swivelling in 2 symmetrical points of rotation (3), equipped with joints antifriction metal, along an axis (X3) parallel in X4, on same the 2 preceding parallel levels on:
- B3: a semi rigid parallelogram at 3 sides, its side higher being shifted at its 2 ends towards the interior of the parallelogram to constitute a bar fixes transverse (T1) supporting seat at the level of the knees of the sat user and allowing the free sliding motion of this one in the rocker. B1, B2 and B3 being assembled and between them such as above, the structure of the carriage of seat thus made up is suspended and fixed on a stable base in the last 4 symmetrical points of rotation 2 by 2 (1 and 2), equipped with joints antifriction metal, along the 2 parallel axes between them (X1 and X2), themselves parallel in X3 and X4. 2 symmetrical equilateral quadrilaterals are thus defined (P1/P2) in 2 deformable parallel plans in rhombuses flattened around their 4 angles and forming between them a deformable parallelepiped symmetrically between the definite preceding plans parallel around items 1, 2, 3 and 4, by rotation on:

3. a stable and rigid base (C) resting on the ground, composed of non deformable symmetrical elements forming mounting and balustrades (F), integrating stops of safety (S) controlling into obstinate the rocker of sat in back position.

Constants and constraints to be respected in the application of this system so that it functions, and this independently of the form of this structure, are:

a) a equidistance between the points of rotation 1, 2, 3 and 4, thus constituting 2 symmetrical equilateral quadrilaterals (P1/P2) in 2 deformable parallel plans in rhombuses, independently of the distance separating the 2 quadrilaterals and thus the 2 plans. The deformable parallelepiped consisted P1/P2, fixed and rotary on a non deformable base, is balanced in its rotation around its centre located in (G'), intersection of the axes joining the opposite tops of the parallelepiped. This centre constitutes with the centre of balance of the weight of the body (G) of the user an axis parallel with the vertical axes of the 2 quadrilaterals.

b) a distance of the axes X1 and X2 on the ground higher than the height of the 2 quadrilaterals P1/P2 (items 1 - 3 and 2 - 4), to allow the suspension of the carriage of seat on the base authorizing the free rocker of the carriage around G without friction on the ground.

This system of chair with suspended ergonomic adjustable and releasing seat, with complete and protected variable slope balanced only by the weight of the body can be declined:

- in all usual materials of the sector of furnishing (metal, wood, composite or different matters) and in varied forms of structure (round, angular..), thus not being subjected to phenomena of mode
- bound for all the economic sectors requiring of practical and comfortable furniture (thalassic and hotels facilities, home and office furnishing, decoration, gardening furniture, hospitality accommodations...)

Setting up of the system

In reference on figures 1/2 and 2/2, the various processes and interactions are set up by the only user sitting in the seat as follows:

- a) The user transfers slightly forwards or backwards his weight from the body (G) supported by seat (A) to obtain the new wished position, without any development of effort.
- b) This transfer of the weight of the body of the user (G) modifies the position of the imaginary axis connecting it to the centre of the parallelepiped (G')

c) involving simultaneously:

- a symmetrical longitudinal deflection of the parallelepiped made possible specifically by its constitution in 2 symmetrical equilateral quadrilaterals in 2 parallel plans (P1, P2) them-even deformable in flattened rhombuses, defined each side by joining their points of rotation 1 - 2 - 3 and 4, who swivel by rotation on the stable base around the 2 axes (X1, X2), like around 2 other parallel axes of rotation (X3, X4). These 4 axes correspond to the swing angles of the quadrilaterals (1, 2, 3, 4).
- a free sliding motion of the seat (A), fixed and swivelling (T5, T2) on the balanced and suspended carriage of seat (B1, B2, B3) which swivels (X1, X2) on a stable and rigid base (C), and sliding freely on the level of the knees on bar (T1) and on the level of ankles (T3)

The balance transfer on seat involves the balance transfer of the carriage in the new position of balance. The carriage of seat thus undergoes by rotation around its centre and on its axes a double movement controlled by the weight of the body of longitudinal rocker and lengthening (or rectification) in the direction of the displacement of weight printed by the user.

The footrest (R) integrated in the carriage of seat naturally follows the lengthening or the rectification of the carriage, supporting the legs in all the positions.

The simple transfer of his body weight by the user thus involves the controlled dynamic tilting of the whole system of seating of the chair, lengthening or rectifying, partially or completely, the chair according to the desired position. All the positions obtained are stable and do not require any effort to be maintained.